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ABSTRACT

Two articles provide perspectives on computers and gender and on multicultural education. The first article, "Beyond Equal Access: Gender Equity in Learning with Computers" (June Mark), explores the lack of access girls and young women have to computers and the implications for future educational opportunities as well as career options. A relationship exists between positive experiences with computers and future interest in and facility with computers. Designing equitable learning contexts with software and related materials and designing equitable classroom organization and interactions are discussed. The second article, "Multicultural Education as Democratic Education" (Katherine Hanson), looks at how democracy can best be developed through multicultural education that respects the individual, enables all students to see themselves in the curriculum, and fosters a deep understanding and acceptance of differences as legitimate and empowering. Reciprocal acculturation is an important aspect in the development of approaches to multicultural education. A list of several programs, projects and publications provide further information on the issues of gender, equity, technology, and mathematics achievement. (CK)

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Beyond Equal Access
Gender Equity in
Learning with Computers

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WOMEN'S EDUCATIONAL EQUITY ACT PUBLISHING CENTER DIGEST

Beyond Equal Access
Gender Equity in Learning with Computers

By June Mark, Center for Learning, Teaching, and Technology, EDC

Lack of access holds implications for future educational opportunities as well as career options and choices.

As we approach the year 2000, computers are becoming commonplace tools in our workplaces, schools, and homes, changing the ways in which we work, learn, and communicate with one another. According to U.S. Department of Labor predictions, by the year 1995 at least two million people will be employed in occupations directly related to computers, and millions of others will use computers as a routine part of their jobs.[1] Computer-related occupations are expected to grow 5 percent per year in the 1990s.[2] Computers have, for both good and bad, transformed the nature and environment of work. Since women are a growing segment of the U.S. labor force, making up almost two-thirds of the new entrants into the work force between 1987 and 2000,[3] computers have and will continue to have a substantial impact on women's lives.

Because developing familiarity and facility with computers is an important educational goal for *all* students, schools need to ensure equity in computer access, use, and outcomes. However, numerous studies have examined and documented inequities, especially with respect to girls and young women. Given that the presence of computers in our schools and workplaces is likely to increase, there is a need to understand why inequities in computer use exist and to develop effective strategies to ensure equal opportunities and equitable consequences for all students in interactions with computers. This article focuses on gender equity in learning with computers and includes a review of relevant research and practice.

One caution: while we know that social class and racial/ethnic inequities exist with regard to computer access and educational outcomes, studies that consider race/ethnicity, gender, and class simultaneously are few. For a true picture of gender issues with regard to computers—one that acknowledges the many differences among females, we need to know more about all of these issues.

Gender differences in school computer access, use, and interest

There are many factors—psychological, social, attitudinal, and environmental—that contribute to the existing conditions. These issues are of concern not simply because girls and young women have less access, but because lack of access holds implications for future educational opportunities as well as career options and choices.

Gender differences have been documented in both computer use and access; girls are more likely to use computers for word processing, while boys are more often programming computers. Boys have significantly more positive attitudes toward computers than girls, finding computers more "enjoyable," "special," "important," and "friendly" than girls do.[4]

A computer gender gap usually starts becoming noticeable at the middle school level and widens as girls get older.[5] Gender differences are more evident in advanced classes than in introductory courses.[6] Girls tend to have less confidence in their own use of computers, and both boys and girls perceive computers as predominantly in the domain of males. These attitudes contribute to lower enrollments in computer courses and in varying levels of interest.

Computer use in informal settings

In voluntary, out-of-school uses of computers,

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June 1992

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Beyond equal access. . . continued

even greater gender differences have been found. Boys are more likely than girls to have access to and use a computer in their home, in a friend's home, or in a computer camp.[7] Miura and Hess found that boys are roughly three times as likely to enroll in computer camps and summer classes, with variations increasing with grade level, cost of program, and difficulty level of course.[8] In another study of students who had not yet received computer instruction in school, over 60 percent of boys had a computer at home compared to 18 percent of girls, and 28 percent of girls versus 64 percent of boys reported knowing how to work with computers.[9]

Students are more likely to be engaged and motivated in using the computer if they see it as an important tool for accomplishing their own goals.

Effects of experience on attitudes

Several researchers have found a relationship between positive experience with computers and future interest in and facility with computers. Loyd and Gressard found that students' attitudes toward computers are significantly affected by computer experience, and that differential computer experience accounts for differences in attitudes more so than gender does.[10] In one study, researchers found that experience with computers reduces the attitude differences regarding boys' versus girls' abilities with computers, and, therefore, reduces the prevalence of sex stereotypes among boys and girls.[11] Questions regarding the types and effects of experience with computers, especially on continued interest in working with computers and on attitudes, deserve further investigation.

Computers associated with math and science

There have been widespread data collected about gender bias in student learning of mathematics and science,[12] and there is concern that these inequities will be mirrored in the use of computers in education. Because computers are so often linked with mathematics and science, long considered male domains, how computers are being used in teaching and learning may have serious consequences for the learning opportunities of girls. Especially in secondary schools, computers are more often clustered in math and science departments. And apart from the fact that girls at present are less inclined to be interested in math and science activities than boys are, the fact that teachers in these areas are predominantly male significantly reduces the opportunity for girls to have female role models who use computers.

Learning context

Computers are versatile tools, suitable for a range of activities in schools from music to mathematics, including design, problem solving, writing, and planning. Linn hypothesizes that both the function for which the computer is used and the organization of the learning setting affect the engagement of girls and boys with the technology.[13] Fewer gender differences are reported when computers are used for computer-assisted instruction, games, simulations, or word processing. Some researchers have found that boys are more interested in competitive games such as the software in video arcades while girls are more interested in the computer when they are working with word games, logic puzzles, art, music, "story" programs, and adventure games.[14] Because many students develop their impressions about computers in schools, it is important that the computer tasks and the software meet the learning needs of students and represent uses of technology that emphasize the strengths of computers to solve problems, aid in decision making, and achieve goals that are important and relevant to students. Computers are not inherently biased, yet in the contexts they are used they can often take on characteristics that reinforce gender bias.[15]

Given that learning experiences and context influence students' computer use, and perceptions about computers, what are some effective strategies that incorporate these ideas into actions for promoting equity in the use of computers?

Designing equitable learning contexts: software and related materials

As more and more computer software specifically designed for varied educational purposes becomes available, teachers and students will have a greater range of options, and software can be selected to more closely match individual student needs. Students are more likely to be engaged and motivated in using the computer if they see it as an important tool for accomplishing their own goals.

One method to illustrate computers' usefulness in problem solving and relevance to many activities and subjects, is for teachers to develop specific computer design or research projects for their students. These types of projects get students actively involved in learning, let them have fun, and have them using computers as an integral part of their work in a number of different ways (for example, design and drawing, model building, measurement and calculation, word processing).

Designing equitable classroom organization and interactions

One particular teaching strategy that appears effective in engaging females in the use of computers is structuring collaborative learning experiences. This is consistent with evidence that it is not only what software is used in classrooms, but how it is used, that impacts student engagement with computers. There is some indication that collaboration may be a preferred work context for girls.[16] Software games in which children were required to play cooperatively appealed more to girls,[17] as did teacher-structured collaborative activities.

Teachers can also involve students in discussion about the equity issues in using technology.

Continued p. 6, "Beyond equal access"

Multicultural education as democratic education

By Katherine Hanson, Associate Director, Center for Equity and Cultural Diversity

As this nation nears the end of the century, we are acknowledging a world very different from that perceived of as the "good old days."[1] Too often the discussion revolves around the statistics of color—"By the year 2000, one out of three Americans will be a member of a racial minority"[2]—rather than around the issue of how we can most effectively educate the majority of our students. In the years ahead, our education system must begin to address those structural changes through which we can empower our students. We must ask, "why is this diversity so often viewed as a problem to be solved? Why isn't it a wonderful opportunity to build a new, more diverse, and much more interesting society for all of us to live in? Well-meaning as it is, some of the calls to deal with diversity in the classroom sound too much like the Public Health Officer warning us that the measles are coming."[3]

We have always been a nation of diversity. Historically, large segments of the South have had African American majorities, the Southwest has been predominantly Latino, and in other states American Indians/Alaska Natives have been the majority in certain areas. Until fairly recently, however, different cultures and people have remained separate. Now we are living together in a changing cultural pattern that can either create tension or provide for a synergetic renewal of our nation's energy.

As a democratic nation we have provided the model for other countries to follow. Now we, too, must reexamine how to continue to open the democratic process to all people—how do we create a multiracial/multiethnic democracy? And what role does education play in this process? The task now facing us is how to develop models for education that is truly multicultural, truly democratic. Multicultural education may be at the core of this move toward education for democracy, for " . . . if democracy was meant for slaves and descendents of slaves, for women as well as men, for recent immigrants as well as those here for generations, if indeed a democracy which includes all of the nation's people is to be fostered in this country and modeled in this nation's educational system, then the issue of multicultural education must be at the heart, and not on the margins, of all discussions about education."[4]

Democracy can best be developed through multicultural education that respects the individual, enables all students to see themselves in the curriculum, and fosters a deep understanding and acceptance of differences as legitimate and empowering. Multicultural education can then be the way to move beyond the separations that exist to a new culture. As one principal, concerned with reducing the levels of street violence stated, "I used to say multicultural education was the right thing to do; now I know it's the only thing to do. If our schools can teach students to respect one another, can give them the experience of living together peacefully, then we'll have fewer lives lost."[5]

Multicultural education is not a panacea for all educational or social problems, but it does offer significant hope for change. Multicultural education, within the context of education for democracy, is not merely a lesson in human relations or an interesting "add-on." Rather, as defined by a range of educators and researchers (Banks, Sleeter, Sleeter and Grant, Cummins), multicultural education is a *process* of systemwide reform and restructuring that includes all facets of education. Focusing on the structures of schools and their role in educating for democracy, Sonia Nieto's definition of multicultural education is instructive: "Multicultural education is a process of comprehensive school reform and basic education for all students. It challenges and rejects racism and other forms of discrimination in schools and society and accepts and affirms the pluralism . . . that students, their communities, and teachers represent. Multicultural education permeates the curriculum and instructional strategies used in schools, as well as the interactions among teachers, students, and parents, and the very way that schools conceptualize the nature of teaching and learning. Because it uses critical pedagogy as its underlying philosophy and focuses on knowledge, reflection, and action (praxis) as the basis for social change, multicultural education furthers the democratic principles of social justice."[6]

Multicultural education becomes the way in which educational restructuring can best model education for democracy. Because multicultural education is a process, it is often misunderstood by those seeking a program to add on to what they are already doing. In her discussion of this phenomenon, Christine Sleeter cautions that individuals "usually build [multicultural education] around many taken-for-granted ideas that White Americans have about race. In the process, what gets done may not really change anything, but gives the illusion of doing so. . . . [E]ssentially, multicultural education . . . is about challenging oppression."[7] With democracy at its core, multicultural education can help schools examine how we have fostered separations and provide guidance to reduce those separations. As a process, multicultural education enables us to examine our own attitudes and beliefs about diversity and to examine those structures within our organizations that inhibit or promote a multicultural environment. This process then leads to the development of a new culture within schools.

"Some of the calls to deal with diversity in the classroom sound too much like the Public Health Officer warning us that the measles are coming."

Multicultural education. . . continued

Reciprocal acculturation is an important aspect in the development of our approaches to multicultural education.

Schools, as democratic institutions, have struggled to define what this new culture of diversity looks like. Cox and Blake define the features of a multicultural organization as pluralism—reciprocal acculturation—where all groups respect, value, and learn from one another; full structural integration of all groups so they are well represented at all levels of the organization; full integration of minority culture-group members, women, and others in the informal networks of the organization; an absence of prejudice and discrimination; equal identification of minority and majority group members with the goals of the organization and with opportunity for alignment of organization and personal career goal achievement; a minimum of inter-group conflict based on race, gender, nationality, language, sexual preference, and other identity groups of organization members.[8]

A key point here is the reciprocal acculturation of all groups. Schools can take a lesson in this regard from corporations that see heterogeneity as promoting creativity and innovation, which together with organizational coherence and unity raise the quality of decision making and productivity. This point of reciprocal acculturation is an important aspect in the development of our approaches to multicultural education, for it enables schools to build a new, inclusive, democratic culture rather than continue to address the needs of large segments of the student population as if they were somehow outside the norm.

The Center for Equity and Cultural Diversity has developed an interdisciplinary framework for examining pluralism. This framework explores the balance between the individual and the institution in creating a democratic, pluralistic culture. Once individuals understand their own attitudes and behaviors—within the context of their socialization—they can then begin to examine how these and similar issues play out within the larger organization. There is an interplay or tension between the individual and the community, whether that community is defined as the school system, the corporation, or the city. Without an understanding of this symbiotic role, no significant long-term changes can occur. Thus, in order to create the democratic society we envision, we must explore our own belief systems and discover how they affect the institutions in which we find ourselves. At the same time, we must acknowledge that institutional values will also affect both our perceptions of the world and our individual behaviors.

Jerome Bruner, in his most recent book, *Acts of Meaning*, emphasizes that meaning-making emerges from social interactions mediated by culturally constructed narratives. This meaning-making is the construction of an individual's logic through interaction with others.[9] The work of the Center for Equity and Cultural Diversity continues to focus on this point—how we make meaning of our lives and how we can develop education that ". . . leads our students, our graduates, and ourselves as educators, to reject mindlessness in any form, to demand—for ourselves and our students—the alert, critical, engaged consciousness which can only come from thinking minds in dialogue with—and ultimately in community with—people who bring different stories, and tell different tales, so that something truly new can emerge."[10]

The Center for Equity and Cultural Diversity seeks to work with educators struggling to define the philosophy and practical applications of multicultural education as education for democracy. In this process, we hope to create the space, as Maxine Greene describes, "for expression, for freedom . . . a public space . . . where living persons can come together in speech and action, each one free to articulate a distinctive perspective, all of them granted equal worth. It must be a space of dialogue, a space where a web of relationships can be woven, and where a common world can be brought into being and continually renewed."[11]

For more information on the full range of activities of the Center for Equity and Cultural Diversity, contact Vivian Guilfoy, director, at 617-969-7100.

Notes

[1]I wish to thank James Fraser of Lesley College for his construction of education for democracy in a multicultural context on which I have built this discussion.

[2]*A Nation Prepared: Teachers for the 21st Century: The Report of the Task Force on Teaching as a Profession* (New York: Carnegie Forum on Education and the Economy, 1986), 79.

[3]James W. Fraser, "Transforming Academic Institutions: Multicultural Education," keynote address at Salem State College, Salem, Mass. (September 4, 1991). For a fuller analysis of the centrality of multicultural education in a democratic society, see Theresa Perry and James W. Fraser, *Freedom's Plow: Schools as Multiracial, Multiethnic Democracies* (New York: Routledge, forthcoming).

[4]Fraser, keynote address.

[5]Comment by panelist at CECD training conference "Valuing Diversity in Schools" in Indianapolis, Indiana, February 1992.

[6]Sonia Nieto, *Affirming Diversity: The Sociopolitical Context of Multicultural Education* (New York: Longman, 1992), 208.

[7]Christine Sleeter, "Multicultural Education as a Process, Not a Program" in Susan Gould, Tom LoGuidice, and Christine Sleeter, *Strategic Planning for Multicultural Education*. Working manuscript. For a full discussion of Sleeter's work, see Christine Sleeter, *Empowerment Through Multicultural Education* (Albany, New York: State University of New York Press, 1991).

[8]Taylor H. Cox and Stacy Blake, "Managing Cultural Diversity: Implications for Organizational Competitiveness," *Academy of Management Executives* 5, no. 3 (1991): 52.

[9]Jerome Bruner, *Acts of Meaning* (Cambridge, Mass.: Harvard University Press, 1990).

[10]Fraser, keynote address.

[11]Maxine Greene, "Excellence, Meanings, and Multiplicity," *Teachers College Record* 86, no. 2 (Winter 1984): 296.

WEEA computer equity materials . . . continued

In addition, AIR, in conjunction with Big Brothers/Big Sisters of America, Inc., developed a pilot project called SISCOM that pairs children and their big sisters or brothers in a co-learning approach. SISCOM uses fun activities and games to expose little and big brother and sister matches to different uses for computers, to help them develop problem-solving skills, and to give them practice in using a variety of educational software programs.

WEEA publications

Add-Ventures for Girls: Building Math Confidence combines teacher development with strategies that work in teaching mathematics to girls and includes a chapter on computer equity issues. The chapter outlines the bias against girls in computer education and gives a list of questions for schools or specific teachers to assess the computer learning climate for girls at their school. It also offers strategies for making computer education more accessible to girls by making sure software is interesting for girls, by encouraging parent support, developing computer clubs, and ensuring that girls get as much time on the computer as boys.

The Sky's the Limit in Math-Related Careers educates high school students about careers in math and science. Women working in computer science, engineering, and other math-related fields offer lively anecdotes, viewpoints, and inside information about their careers. *The Sky's the Limit* offers a chapter that details various types of careers in the field of computers.

Other projects of interest

Pathways for Women in the Sciences at Wellesley College Center for Research on Women is researching the barriers that prevent women from entering and remaining in scientific careers and the factors that would support a culture of success for creating women scientists. At the end of the study, "The Wellesley Report" will be issued and will serve as the basis for a conference to share findings with higher education, business, government, and private foundations.

The corporate-funded Computer Equity Expert Project at the Women's Action Alliance aims to reduce girls' computer avoidance. Two hundred educational trainers—specialists in computer education, gender equity, mathematics and/or science—attended six-day seminars where they acquired a feminist analysis of math and science, received instruction in gender equity in education, in girls and women in mathematics and science, in educational technology, and honed their training skills. The Computer Equity Expert Project has also established the Computer Equity Electronic Network and publishes a newsletter, *Computer Equity News*.

Listed below are the products and projects mentioned in this article. The WEEA Publishing Center materials may be purchased by mailing a check or money order for the amount of the order (plus $2 shipping for orders under $25; $4 for orders $25 and over) to the WEEA Publishing Center. To order by phone, using MasterCard, Visa, or purchase orders over $25, or for information on additional resources available through the WEEA Publishing Center, call 800-225-3088 (in Massachusetts call 617-969-7100).

WEEA products

Add-Ventures for Girls: Building Math Confidence, #2709 elementary $25.00; #2710 middle school $28.00

The Sky's the Limit in Math-Related Careers, #2237 $6.75

WEEA-funded projects

Mathematics, Science, and Computer Careers for Rural Women: A Model for Educational Equity
Dr. Tim Alford
Enterprise State Junior College
P.O. Box 1300, Enterprise, AL 36331
(205)347-2623

Collegiate Science and Technology Entry Program
Stuart Weinberg
CSTEP
Onondaga Community College
Route 173, Syracuse, NY 13215
(315)469-2475

The Neuter Computer: Computers for Girls and Boys
Women's Action Alliance, Inc.
370 Lexington Avenue, Suite 603
New York, NY 10017
(212)532-8330

Debugging the Program: Computer Equity Strategies for the Classroom Teacher
The Project on Equal Education Rights (PEER)
NOW Legal Defense and Education Fund
99 Hudson Street, New York, NY 10013
(212)925-6635

IDEAS for Equitable Computer Learning
SISCOM (Co-learning Computer Instructional Models)
American Institutes for Research
Center for Educational Equity
Box 1113, Palo Alto, CA 94302
(415)493-3550

Other projects

Pathways for Women in the Sciences
The Pathways Project
Center for Research on Women
Wellesley College, Wellesley, MA 02181-8529
(617)235-0320

The Computer Equity Expert Project
Women's Action Alliance
370 Lexington Avenue, Suite 603
New York, NY 10017
(212)532-8330

Beyond equal access. . . continued

As an introduction, teachers can share research on computer equity with students, asking students what they think about the issues, discussing any questions they may have, and any issues that students feel don't make sense to them or that they don't understand. Teachers and/or students may be interested in doing their own research projects to analyze equity in computer use, access, and classroom interactions in their school. This can get students involved in understanding the issues and in educating others throughout the school.

Staff development

Changes in attitudes and practice do not happen overnight. They require time, good ideas and examples, resources, and support in order for teachers to effectively integrate computers into their curricula. Teacher training and development focused on gender equity and on integrating and ensuring equity in all learning activities is an important component to ensuring change and equity. Action research, an innovative teacher professional development model, involves teachers in designing and planning classroom research projects and reflecting upon the findings and implications with the support of colleagues. It creates grounded knowledge and understanding for teachers and the impetus to improve their teaching and learning.[18]

It is important for schools to go beyond equal access . . . by providing targeted opportunities to encourage girls.

Many teachers also need additional computer training themselves, to become comfortable with using computers and to develop ideas for integrating computers into what they are currently teaching. Collegial support will help to reduce some teachers' anxiety about using computers and to ensure equitable implementation.

Infusing equity schoolwide

It is important for schools to go beyond equal access in attempting to balance differences in exposure by providing targeted opportunities to encourage girls to be more involved with and persist in using computers. Girls should be educated and encouraged that mathematics and science are important and relevant to their lives. Mathematics and science teachers as well as guidance counselors can play a role in suggesting education and employment opportunities in technology-related fields. It is also important to develop partnerships between computer equity programs and organizations outside of the school, investigating and developing links with effective out-of-school programs such as Girls, Inc.'s Operation SMART™. Providing opportunities for students to support each other's efforts and to share their experiences, ideas, and resources helps, too. Partnerships with local business and industry can serve as resources for community involvement in schools, provide opportunities for students to interact with role models, and, perhaps provide some funding for innovative programs.

Principals, superintendents, and other school personnel should also be involved in promoting computer equity. Some ways to accomplish this goal include involving teachers and other school personnel, particularly females, in planning computer use as well as in the acquisition of computer hardware, software, and curriculum materials. King found that participation in planning activities resulted in higher levels of commitment to ensuring appropriate and equitable computer use in schools.[19]

Peer support

Friends and peers also play a role in students' interactions with computers. Especially in adolescence, girls are particularly sensitive to perceptions of themselves in terms of social acceptance. Sanders found that one reason girls were reluctant to join computer clubs was because their friends weren't there.[20] Therefore there is a need for girls to be supported and encouraged in their use of computers, for example, a girls' computer club or class period. In addition, peer training in which students, especially females, help and support each other in using classroom computers can make learning to use a computer a more comfortable and fun experience.

Role models and mentors

Girls define themselves through social interaction, connecting and communicating with others, more so than boys do,[21] and therefore, are more likely to avoid the computer they may have experienced as rigid, rule-based, and isolating from others. There is a need for role models to counterbalance the perceptions and images that imply that math, science, and technology are not relevant to girls' lives. There needs to be recognition for women who actively participate in using computers, as well as mechanisms for these women to mentor and serve as role models for girls. For example, a career day can showcase the contributions of women in computer and technology-related fields. In addition, women involved in computers from a range of occupations, including graphic design, writing, desktop publishing, architecture, and engineering, can be invited to share their experiences and challenges.

Parental support

Positive parental attitudes can influence the attitudes of children toward computers. There is evidence to suggest that parents tend to be more encouraging and supportive of boys' learning in mathematics than of girls' and there is some initial evidence that this may be true with regard to computers as well.[22] At home, a mother can be an important role model for her daughter since girls become more interested in computers when they see their mothers using them.[23] Parents need to encourage both daughters and sons in the use of computers, in terms of the time they spend together, and the types of activities and interactions

they have around the computer. Parents should also talk with their children about what they are doing with computers in schools.

Need for research

Researchers need to focus on equity issues in investigating the effects and implications of computer use in schools. As computers become part of our society, it is imperative that we consider equity issues in relation to a tool that has wide educational, economic, social, and political impact.

While relatively few interventions exist, there is a need for review and dissemination of effective programs, more information on how interventions are working, why they are working, and how they could be adapted for other settings.

Rethinking gender equity in learning with computers

Achieving gender equity with respect to computers and learning is a challenge and requires the commitment and efforts of many players—teachers, school personnel, peers, parents, curriculum and software developers, educational researchers, and gender equity program developers—in promoting equity and changing the climate for computer equity in schools and in society. In addition, gender equity in learning with computers requires attention in a number of dimensions, including how computer access is determined and allocated, how computers are used, how the learning context is structured, how teachers interact with students around computers, how students interact with each other using computers, how parents value and support their children's use of computers, and how society depicts computer users. Often, equity issues are an "after-the-fact" or misunderstood consideration. But given what is known about gender bias in learning with computers, equity issues need to be an integral part of designing and planning effective education for students.

Notes

[1] Linda Lewis, "Females and Computers: Fostering Involvement," in *Women, Work, and Technology: Transformations*, ed. by B. D. Wright (Ann Arbor, Mich.: University of Michigan Press, 1987), 268–80.

[2] Anthony Patrick Carnevale, *America and the New Economy: How New Competitive Standards Are Radically Changing American Workplaces* (San Francisco: Jossey-Bass, 1991).

[3] William B. Johnston, *Workforce 2000: Work and Workers for the 21st Century* (Indianapolis, Ind.: Hudson Institute, 1987).

[4] Tamar Levin and Claire Gordon, "Effect of Gender and Computer Experience on Attitudes Toward Computers," *Journal of Educational Computing Research* 5, no. 1 (1989): 69–88.

[5] J. S. Sanders, "Computer Equity for Girls," *Sex Equity in Education: Readings and Strategies*, ed. by A. O. Carelli (Springfield, Ill.: Charles C Thomas, 1988), 157–73.

[6] Robert D. Hess and Irene T. Miura, "Gender Differences in Enrollment in Computer Camps and Classes," *Sex Roles* 13, no. 3/4 (1985): 193–97.

[7] Milton Chen, "Gender and Computers: The Beneficial Effects of Experience on Attitudes," *Journal of Educational Computing Research* 2, no. 3 (1986): 265–82.

[8] Irene T. Miura and Robert D. Hess, "Enrollment Differences in Computer Camps and Summer Classes," *The Computing Teacher* 11, no. 8 (April 1984): 22.

[9] Levin and Gordon.

[10] B. H. Loyd and C. Gressard, "The Effects of Sex, Age, and Computer Experience on Computer Attitudes," *AEDS Journal* 18, no. 2 (1984): 67–76.

[11] Chen.

[12] M. Sadker, D. Sadker, and S. Klein, "The Issue of Gender in Elementary and Secondary Education," in *Review of Research in Education*, vol. 17, ed. by G. Grant (Washington, D.C.: American Educational Research Association, 1991), 269–334; Mary Schatz Koehler, "Classrooms, Teachers, and Gender Differences in Mathematics," in *Mathematics and Gender*, ed. by E. Fennema and G. Leder (New York: Teachers College Press, 1990), 128–48; G. Leder, "Teacher/Student Interactions in the Mathematics Classroom: A Different Perspective," in *Mathematics and Gender*, ed. by E. Fennema and G. Leder, 149–68; Wellesley College Center for Research on Women, *The AAUW Report: How Schools Shortchange Girls* (Washington, D.C.: AAUW Educational Foundation, 1992).

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Equity issues need to be an integral part of designing and planning effective education for students.

Maria-Paz Beltran Avery, author of "Reflections on the Intercultural Encounter" in the February 1992 issue, acknowledges the contributions of her colleagues at Interculture, Inc., in the definition of culture used in that article.

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WEEA computer equity materials aid teachers

The Women's Educational Equity Act (WEEA) Program was one of the first programs to develop materials to enhance the math achievement of women. It continues to maintain this leadership by providing funds to explore the issue of gender equity and technology in various projects around the country.

WEEA projects

Using innovative methods, a 1991 WEEA grantee, Collegiate Science and Technology Entry Program (CSTEP) at Onondaga Community College, integrates computers into the curriculum. The program supports students of color and low-income students (average age 32 years) who are potentially interested in or are pursuing careers in scientific, technical, or health fields. Also a current WEEA grantee, the Mathematics, Science, and Computer Careers for Rural Women: A Model for Educational Equity Project at Enterprise State Junior College, Alabama, offers educational activities in the areas of math, science, and computer science to seventh- and eighth-grade girls from a mainly rural area.

The Women's Action Alliance (WAA) utilized a WEEA grant to develop *The Neuter Computer: Computers for Girls and Boys*. This publication offers insights into how and why to encourage computer use by girls and close the computer gender gap. In a national field test of this book, girls' computer participation increased 144 percent in one term.

The Project on Equal Education Rights (PEER) of the NOW Legal Defense and Education Fund, using WEEA and other funds, developed *Debugging the Program: Computer Equity Strategies for the Classroom Teacher*. The kit includes a handbook containing excerpts from four outstanding computer equity curricula: *The Neuter Computer: Computers for Girls and Boys; Off and Running: The Computer Off Line Activities Book*, by EQUALS, Lawrence Hall of Science, University of California at Berkeley; *Project MICRO (Minority Computer Resource Opportunity)*, by the Southern Coalition for Educational Equity, Atlanta, Georgia; and *Pathways—An Introduction to Computers*, by Technical Education Research Centers, Cambridge, Massachusetts.

PEER's National Center for Computer Equity publishes the *Computer Equity Report* and other materials to help parents and community groups work for equity in their local communities. The center acts as a clearinghouse for information on model programs that have documented the effective use of computers in providing solutions to equity problems related to race, sex, and disability bias. It also serves as an advocate at the national level for planned investment in the future of all children through the equitable distribution of technological resources.

The Center for Educational Equity, a division of American Institutes for Research (AIR), received a WEEA grant to prepare a package of instructional strategies: *IDEAS for Equitable Computer Learning*. The package includes a survey for students to assess their computer experience at school and at home; an education self-assessment checklist; a resource paper on early childhood computer readiness for K-3 teachers; a paper on out-of-school computer access as an equity issue; and a bibliography on gender equity in computer use.

Continued p. 5, "WEEA computer equity materials"

WEEA Working Papers present in-depth discussions on cutting-edge issues in gender equity:
Teaching Mathematics Effectively and Equitably to Females $4.00 (#2744)
Building Self: Adolescent Girls and Self-Esteem $4.00 (#2745)
Legislation for Change: A Case Study of Title IX and the Women's Educational Equity Act Program $4.00 (#2749)

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